

In re: Appln No. **10/603,332**  
Amendment dated March 19, 2006  
Reply to Office action of January 26, 2006

This listing of claims replaces all prior versions and listings of claims in the application:

**Listing of Claims:**

1. (canceled)
2. (canceled)
3. (canceled)
4. (canceled)
5. (canceled)
6. (canceled)
7. (canceled)
8. (canceled)
9. (canceled)
10. (canceled)
11. (canceled)
12. (canceled)
13. (canceled)
14. (canceled)
15. (canceled)
16. (canceled)
17. (canceled)
18. (canceled)
19. (canceled)
20. (canceled)
21. (canceled)
22. (canceled)
23. (canceled)
24. (canceled)
25. (canceled)
26. (canceled)
27. (canceled)



In re: Appln No. 10/603,332  
Amendment dated March 19, 2006  
Reply to Office action of January 26, 2006

28. (canceled)

29. (canceled)

30. (canceled)

31. (currently amended) A metal powder composition wherein said powder particle size is less than 500 nanometers and smaller than powder precursor having enhanced thermal conductivity and reduced energy consumption electrical conductivity, produced wherein said powder is reduced from a coated powder precursor in combination a in at least one fluid selected from the group consisting of solvents, monomers, interpolymers, polymers, phase change material, heat transfer fluid, swellable polymers, swellable polysaccharides, electrolyte, spent etchant, ionic surfactants, ionic liquids, supercritical liquids or combinations thereof wherein said coated powder precursor has an average particle less than 2 microns.

- a. ~~coated powder precursor having average particle less than 2 microns sizes in the nanometer to micron size range produced by a process step selected from the group of solubilized, dispersed, emulsified, grinded, spray atomized and vaporized; and~~
- b. ~~coating imparted to the powder precursor particles; and~~
- c. ~~reaction medium fluid selected from the group consisting of solvents, fluids, monomers, interpolymers, polymers, and phase change materials.~~

32. (currently amended) The ~~coating imparted to the powder precursor particles~~ according to claim 31, wherein the ~~coating imparted to the coated powder precursor particles further comprises a coating capable of acting in stoichiometric excess and has at least one function selected from the group consisting of as at least one of imparting composition stabilization, corrosion resistance and acting as a dispersant, or combinations thereof.~~

33. (currently amended) The ~~coating imparted to the powder precursor particles~~ according to claim 32, wherein the ~~coating imparted to the coated powder precursor particles~~ is prepared by one of:

- a. complexing a coating compound with powder precursor particles;
- b. adsorbing a coating compound on surfaces of the powder precursor particles; or
- c. organometallic chemistry.



In re: Appln No. 10/603,332  
Amendment dated March 19, 2006  
Reply to Office action of January 26, 2006

34. (canceled)

35. (currently amended) The powder according to claim 31, wherein the in-situ-complexing of coating compound on coated powder precursor is reduced by one method selected from the group consisting of: particles according to claim 34 is prepared by one of:

- a. microemulsions and chemical reduction of pre-complexed metal salts;
- b. microemulsions and reduction of pre-complexed metal salts using sonochemistry;
- c. sonochemistry using high or ultrahigh frequency acoustic wave generation of cavitation in reaction vessel for reduction of pre-complexed metal salts;
- d. sonochemistry using high or ultrahigh frequency acoustic wave generation of cavitation onto plating surface through plating by electroless deposition of pre-complexed metal salts;
- e. sonochemistry using high or ultrahigh frequency acoustic wave generation of cavitation onto plating surface through plating deposition by electrolysis of pre-complexed metal salts;
- f. sonochemistry using high or ultrahigh frequency acoustic wave generation of cavitation onto plating surface through plating deposition by electrolysis of pre-complexed metal salts using high frequency electrical power source;
- g. submicron atomization of pre-complexed metal salts in liquid carrier with in situ chemical reduction;
- h. submicron atomization of pre-complexed metal salts in liquid carrier with in situ electrochemical reduction;
- i. submicron atomization of pre-complexed metal salts in liquid carrier within vessel with voltage potential between atomizer and cathode;
- j. plasma processing of powder precursor with quenching in liquid carrier having pre-solubilized complexing coating compound;
- k. combustion synthesis processing of powder precursor with quenching in liquid carrier having pre-solubilized complexing coating compound;
- l. pre-complexed powder precursor dissolved in supercritical fluid with in situ chemical reduction;



In re: Appln No. 10/603,332

Amendment dated March 19, 2006

Reply to Office action of January 26, 2006

- m. pre-complexed powder precursor dissolved in supercritical fluid with in situ electrochemical reduction;
  - n. electrolysis of pre-complexed metal salts using high frequency electrical power source on anode and cathode;
  - o. electrolysis of pre-complexed metal salts using electrically conductive material selected from group of electrolyte or conductive polymer;
  - p. high pressure hydrogen chemical reduction reaction of powder precursor in liquid carrier having pre-solubilized complexing coating compound;
  - q. high pressure hydrogen chemical reduction reaction of powder precursor in liquid carrier having pre-solubilized complexing coating compound in combination with high or ultrahigh frequency acoustic wave generation of cavitation in reaction vessel;
  - r. high pressure hydrogen chemical reduction reaction of powder precursor in liquid carrier having pre-solubilized complexing coating compound in combination with high or ultrahigh frequency electromagnetic force generation in reaction vessel;
  - s. cryogenic embrittlement in combination with processes selected from the group of high pressure hydrogen embrittlement, or high | ultrahigh frequency acoustic wave generation of cavitation in reaction vessel; or
  - t. electrodialysis of pre-complexed metal salts in combination with processes selected from the group of high pressure hydrogen embrittlement, or high | ultrahigh frequency acoustic wave generation of cavitation on cathode.
36. (previously presented) The powder according to claim 31, wherein the powder is selected from the group of metals consisting of copper, titanium, nickel, beryllium, iron, silver, gold, alloys thereof, blends thereof, and compounds thereof.
37. (currently amended) The ~~reaction-medium~~ powder according to claim 31, whereby the ~~reaction-medium~~ fluid is further comprised of powders selected from the group of carbons consisting of graphite, carbon nanotubes, diamond, fullerene carbons of the general formula  $C_{sub.2.sub.n}(C_2)_n$ , where n is an integer of at least 30, and blends thereof.
38. (canceled)
39. (canceled)



In re: Appln No. 10/603,332  
 Amendment dated March 19, 2006  
 Reply to Office action of January 26, 2006

40. (currently amended) The ~~reaction-medium powder~~ according to claim 31, wherein the ~~reaction-medium~~ fluid is selected from the group consisting of conjugated polymers, crystalline polymers, amorphous polymers, epoxies, resins, acrylics, polycarbonates, polyphenylene ethers, polyimides, polyesters, acrylonitrile-butadiene-styrene (ABS); polyethylene, polypropylene, polyamides, polyesters, polycarbonates, polyphenylene oxide, polyphenylene sulphide, polyetherimide, polyetheretherketone, polyether ketone, polyimides, polyarylates, styrene, poly(tetramethylene oxide), poly(ethylene oxide), poly(butadiene), poly(isoprene), poly(hydrogenated butadiene), poly(hydrogenated isoprene), liquid crystal polymers, polycarbonate, polyamide-imide, copolyimides precursors, reinforced polyimide composites and laminates made from said polyimides, polyphenylated polynuclear aromatic diamines, fluorocarbon polymers, polyetherester elastomers, neoprene, polyurea, polyanhydride, chlorosulphonated polyethylene, ethylene/propylene/diene (EPDM) elastomers, polyvinyl chloride, polyethylene terephthalate, polyvinylchloride, ABS, polystyrene, polymethylmethacrylate, polyurethane, polyacrylate, polymethacrylate, and polysiloxane, aromatic copolyimide, polyalpholefins, polythiophene, polyaniline, polypyrrole, polyacetylene, polyisocyanurates, and derivatives thereof, vinyl monomers, styrene, vinyl pyridines, N-vinyl pyrrolidone, vinyl acetate, acrylonitrile, methyl vinyl ketone, methyl methacrylate, methyl acrylate, 2-hydroxyethyl methacrylate, 2-hydroxyethyl acrylate; polyols, ethylene glycol, 1,6-hexane diol, 1,4-cyclohexanedicarbinol, polyamines, 1,6-hexadiazine, 4,4'-methylenebis (N-methylaniline), polycarboxylic acids, adipic acid, phthalic acid, epoxides, ethylene oxide, propylene oxide, and cyclohexene oxide, polyalkylene glycols, polyethylene glycol, polypropylene glycol, vinyl polymers, polystyrene, polyvinyl acetate, polyvinylpyrrolidone, polyvinylpyridine, polymethyl methacrylate, organic liquid-soluble polysaccharides, functionalized polysaccharides, cellulose acetate, and crosslinked swellable polysaccharides.
41. (currently amended) The ~~reaction-medium powder~~ according to claim 31, wherein the ~~reaction-medium~~ further comprises a at least one phase change medium is selected from the group consisting of salt-hydrates, organic eutectics, clathrate-hydrates, paraffins, hydrocarbons, Fischer-Tropsch hard waxes, inorganic eutectic mixtures, acetamide, methyl



In re: Appln No. 10/603,332  
 Amendment dated March 19, 2006  
 Reply to Office action of January 26, 2006

fumarate, myristic acid, Glauber's salt, paraffin wax, fatty acids, methyl-esters, methyl palmitate, methyl stearate, mixtures of short-chain acids, capric and lauric acid, coconut fatty acids, propane and methane.

42. (currently amended) The ~~coating imparted to the powder~~ according to claim 31 precursor particles, wherein the ~~coating imparted to the coated powder precursor particles is~~ has at least one coating selected from the group consisting of azoles, benzotriazole, tolyltriazole, halogen resistant azoles, and pentane-soluble amide, pyridine-based compound, pentane-soluble dispersant, an inorganic corrosion inhibitor compound, substituted derivatives thereof, or combinations thereof.
43. (currently amended) The azole powder according to claim 42, wherein the azole is selected from the group consisting comprising of aromatic azoles, diazoles, triazoles, tetrazoles, benzotriazole, tolyltriazole, 2,5-(aminopentyl) benzimidazole, alkoxybenzotriazole, imidazoles, ~~such as~~ including oleyl imidazoline, thiazoles including, ~~such as~~ mercaptobenzothiazole, 1-phenyl-5-mercaptotetrazole, thiodiazoles, halogen-resistant azoles, 5,6-dimethyl-benzotriazole; 5,6-diphenylbenzotriazole; 5-benzoyl-benzotriazole; 5-benzyl-benzotriazole and 5-phenyl-benzotriazole, a combination of alkoxybenzotriazole, mercaptobenzothiazole, tolyltriazole, benzotriazole, a substituted benzotriazole, and/or 1-phenyl-5-mercaptotetrazole, a mixture of a pentane-soluble imidazoline, ~~a pentane-soluble amide, a pyridine-based compound, a pentane-soluble dispersant, and a solvent, and~~ or combinations thereof.
44. (canceled)
45. (currently amended) The ~~coating imparted to the powder~~ according to claim 31 precursor particles, wherein the ~~coating imparted to the coated powder precursor particles comprises a cerium compound for powders~~ at least one powder selected from the group consisting of aluminum and aluminum alloys having a coating comprising a cerium compound.
46. (currently amended) The ~~coating imparted to the powder~~ according to claim 31 precursor particles, wherein the ~~coating imparted to the coated powder precursor particles is~~ comprises at least one powder selected from the group consisting of copper, silver, iron, steel and alloys thereof having at least one coating selected from the group consisting of mercapto-substituted



In re: Appln No. 10/603,332  
Amendment dated March 19, 2006  
Reply to Office action of January 26, 2006

thiodiazoles, amino-substituted thiodiazoles, and mercapto-substituted triazole, amino-substituted triazoles, oleyl imidazoline, triethanolamine, monoethanolamine, or combinations thereof, and ~~monoethanolamine~~ for powders selected from the group of copper, silver, iron, steel and alloys thereof.

47. (currently amended) The ~~coating imparted to the powder precursor particles~~ according to claim 31, wherein the ~~coating imparted to the~~ coated powder precursor particles is in sufficient thickness amount to form at least a molecular monolayer ~~of the coating compound on surfaces of the powder particles.~~
48. (new) The metal powder according to claim 31, wherein the reduced metal powder is further processed by removal of reduction reaction medium, and subsequent further comprised of monomers, interpolymers, polymers, phase change material, heat transfer fluid, swellable polymers, swellable polysaccharides, electrolyte, spent etchant, ionic surfactants, ionic liquids, supercritical liquids or combinations thereof.
49. (new) A metal powder having enhanced thermal conductivity, reduced energy consumption, particle size less than 500 nanometers and a coating in stoichiometric excess having at least one function selected from the group consisting of composition stabilization, corrosion resistance dispersant, or combinations thereof, wherein said powder is further comprised of at least one fluid selected from the group consisting of phase change material, heat transfer fluid, swellable polymers, swellable polysaccharides, electrolyte, ionic surfactants, ionic liquids, supercritical liquids or combinations thereof.
50. (new) A metal powder having enhanced electrical and thermal conductivity, particle size less than 500 nanometers and a coating in stoichiometric excess having at least one function selected from the group consisting of composition stabilization, corrosion resistance dispersant, or combinations thereof, wherein said powder is further comprised of at least one fluid selected from the group consisting of phase change material, conductive polymers, electrolyte, ionic surfactants, ionic liquids, supercritical liquids or combinations thereof.
51. (new) The metal powder according to claim 31, wherein the metal powder is manufactured into high energy efficiency products including engine cooling, heating, air conditioning,



In re: Appln No. 10/603,332  
Amendment dated March 19, 2006  
Reply to Office action of January 26, 2006

refrigeration, thermal storage, heat pipes, fuel cells, battery systems, hot water and steam systems, and microprocessor cooling systems.

52. (new) The metal powder according to claim 49, wherein the metal powder is manufactured into high energy efficiency products including engine cooling, heating, air conditioning, refrigeration, thermal storage, heat pipes, fuel cells, battery systems, hot water and steam systems, and microprocessor cooling systems.

53. (new) The metal powder according to claim 50, wherein the metal powder is manufactured into high energy efficiency products including engine cooling, heating, air conditioning, refrigeration, thermal storage, heat pipes, fuel cells, battery systems, hot water and steam systems, and microprocessor cooling systems.